

AMENDMENT UNDER 37 C.F.R. § 1.116
Application No.: 09/635,141
Atty Docket No.: Q60353

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-5. (canceled).

Claim 6. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer and at least one polyolefin non-foamed layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer and at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder; and

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a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet, and

further comprising a laminating step for laminating and adhering at least one multilayer polyolefin foamed sheet produced, wherein the laminating steps comprises laminating and adhering a produced multilayer polyolefin foamed sheet to itself, or laminating and adhering produced multilayer polyolefin foamed sheets to themselves.

Claim 7. (currently amended): The method for producing a multilayer polyolefin foamed sheet according to claim 6, wherein the multilayer polyolefin foamed sheet co-extruded is folded up, superimposed, ~~and laminated~~ and adhered together in the laminating step.

Claim 8. (currently amended): The method for producing a multilayer polyolefin foamed sheet according to claim 6, wherein the extrusion die is a circular die and the multilayer polyolefin foamed sheet co-extruded into a tubular cylindrical form is laminated and adhered as it is or superimposed, ~~and laminated~~ and adhered after being incised continuously along its longitudinal direction at at least one point.

Claim 9. (canceled).

Claim 10. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin

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foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

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wherein one first extruder and one second extruder are provided and the extrusion die is a circular die, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer are co-extruded into a cylindrical form to form the multilayer polyolefin foamed sheet in the co-extruding step, the method further comprising an incising step for incising the cylindrical multilayer polyolefin foamed sheet along its longitudinal direction at two points to form two multilayer polyolefin foamed sheets, wherein the gas barrier resin sheet is supplied to between the two multilayer polyolefin foamed sheets, which are thereafter laminated and adhered to the both surfaces of the gas barrier resin sheet to form the gas barrier resin layer in the laminating step.

Claim 11. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

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a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and the extrusion die is a circular die, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer are co-extruded into a cylindrical form to form the multilayer polyolefin foamed sheet in the co-extruding step, the method further comprising an incising step for incising the cylindrical multilayer polyolefin foamed sheet along its longitudinal direction at two points to form two multilayer polyolefin foamed sheets, wherein the gas barrier resin sheet is supplied onto at least one surface of the two multilayer polyolefin foamed sheets so as to form an outermost layer and the gas barrier resin sheet and the two multilayer polyolefin

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foamed sheets are laminated and adhered together to form the gas barrier resin layer in the laminating step.

Claim 12. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into

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atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and the extrusion die is a circular die, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer are co-extruded into a cylindrical form to form the multilayer polyolefin foamed sheet in the co-extruding step, the method further comprising an incising step for incising the cylindrical multilayer polyolefin foamed sheet along its longitudinal direction at one point, wherein the gas barrier resin sheet is supplied onto at least one surface of the two multilayer polyolefin foamed sheets and the gas barrier resin sheet and the two multilayer polyolefin foamed sheet are laminated and adhered together to form the gas barrier resin layer.

Claim 13. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material

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for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and the extrusion die is one flat die which has two extrusion openings parallel to each other, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer are supplied to the extrusion openings of the extrusion die to be co-extruded to form two

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multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier resin sheet is supplied to between the two multilayer polyolefin foamed sheets, ~~and laminated~~ and adhered therewith to form the gas barrier resin layer in the laminating step.

Claim 14. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

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a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and the extrusion die is one flat die which has two extrusion openings parallel to each other, wherein the material for forming a polyolefin foamed layer the material for forming a polyolefin non-foamed layer are supplied to the extrusion openings of the extrusion die to be co-extruded to form two multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier resin sheet is supplied onto at least one surface of the two multilayer polyolefin foamed sheets so as to form an outermost layer and the gas barrier sheet and the two multilayer polyolefin foamed sheets are laminated and adhered together to form the gas barrier resin layer in the laminating step.

Claim 15. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for

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forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and two flat dies, each of which has one parallel extrusion opening, are provided as the extrusion die, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed

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layer are respectively supplied to the extrusion openings of the two dies and co-extruded to form two multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier resin sheet is supplied to between the two multilayer polyolefin foamed sheets, ~~and laminated~~ and adhered together to form the gas barrier resin layer in the laminating step.

Claim 16. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein one first extruder and one second extruder are provided and two flat dies, each of which has one parallel extrusion opening, are provided as the extrusion die, wherein the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer are respectively supplied to the extrusion openings of the two dies and co-extruded to form two multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier sheet is supplied onto at least one surface of the two multilayer polyolefin foamed sheets so as to form an outermost layer and the gas barrier resin sheet and the two multilayer polyolefin foamed sheets are laminated and adhered together to form the gas barrier resin layer in the laminating step.

Claim 17. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for

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forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein two first extruders and two second extruders are provided, wherein two flat dies, each of which has one extrusion opening, or two circular dies are provided as the extrusion die, wherein the method uses two sets of producing apparatus comprising one first extruder, one

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second extruder and one extrusion die, wherein the material for forming a polyolefin foamed layer and the material for forming the polyolefin non-foamed layer are supplied to the two sets of manufacturing apparatus and co-extruded to form two multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier resin sheet is supplied to between the two multilayer polyolefin foamed sheets, ~~and laminated~~ and adhered together to form the gas barrier resin layer in the laminating step.

Claim 18. (currently amended): A method for producing a multilayer polyolefin foamed sheet comprising at least one polyolefin foamed layer, at least one polyolefin non-foamed layer and at least one gas barrier resin layer, wherein the method uses a producing apparatus comprising at least one first extruder for extruding a material for forming a polyolefin foamed layer wherein the first extruder is equipped with a foaming agent-supplying device for supplying a foaming agent to a cylinder, at least one second extruder for extruding a material for forming a polyolefin non-foamed layer, at least one extrusion die for co-extruding the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer therethrough to form the multilayer polyolefin foamed sheet and a gas barrier resin sheet-supplying device for supplying a gas barrier resin sheet to the multilayer polyolefin foamed sheet, the method comprising:

a melt kneading step in which, in the first extruder, a resin material for forming a polyolefin foamed layer is melted and the melted resin material for forming a polyolefin foamed layer and a foaming agent supplied from the foaming agent-supplying device are mixed to form the material for forming a polyolefin foamed layer;

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a melting step in which the material for forming a polyolefin non-foamed layer is melted in the second extruder;

a co-extruding step in which the material for forming a polyolefin foamed layer and the material for forming a polyolefin non-foamed layer in their melted states are co-extruded into atmospheric pressure through the extrusion die and the extruded material for forming a polyolefin foamed layer is foamed to form the multilayer polyolefin foamed sheet; and

a laminating step in which a gas barrier resin sheet supplied from the gas barrier resin sheet-supplying device is laminated and adhered with the multilayer polyolefin foamed sheet to form a gas barrier resin layer,

wherein two first extruders and two second extruders are provided, wherein two flat dies, each of which has one extrusion opening, or two circular dies are provided as the extrusion die, wherein the method uses two sets of producing apparatus comprising one first extruder, one second extruder and one extrusion die, wherein the material for forming a polyolefin foamed layer and the material for forming the polyolefin non-foamed layer are supplied to the two sets of manufacturing apparatus and co-extruded to form two multilayer polyolefin foamed sheets in the co-extruding step, wherein the gas barrier resin sheet is supplied onto at least one surface of the two multilayer polyolefin foamed sheets so as to form an outermost layer and the gas barrier resin sheet and the two multilayer polyolefin foamed sheets are laminated and adhered together to form the gas barrier resin layer in the laminating step.

Claims 19-27. (canceled).

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Claim 28. (previously presented): The method for producing a multilayer polyolefin foamed sheet according to claim 6, further comprising an extending step for extending the co-extruded multilayer polyolefin foamed sheet in a direction perpendicular to the extruding direction by means of an extending device, wherein the extending step is conducted after the co-extruding step.

Claim 29. (original): The method for producing a multilayer polyolefin foamed sheet according to claim 28, wherein the extending device is a mandrel.

Claim 30. (original): The method for producing a multilayer polyolefin foamed sheet according to claim 28, wherein an extending ratio achieved in the extending step is from 1.5 times to 4.5 times.

Claim 31. (previously presented): The method for producing a multilayer polyolefin foamed sheet according to claim 6, further comprising a preheating step for preheating the extruded multilayer polyolefin foamed sheet, wherein the preheating step is conducted before at least one of the laminating step and the pressure reducing step.

Claims 32-47. (canceled).

Claim 48. (previously presented): The method for producing a multilayer polyolefin foamed sheet according to claim 6, wherein the extrusion die is a circular die and the material for forming a polyolefin foamed layer and the material for forming the polyolefin non-foamed layer are co-extruded into a cylindrical form in the co-extruding step.